

CLAIMS

I claim:

1. An intelligent vehicle for interacting with a traffic complex, comprising:
sensors monitoring activity in the traffic complex, wherein the sensors feed voice, video and data transmissions into computer-based decision support algorithms designed for programming a computer to advise and initiate appropriate predetermined response plans.

2. An intelligent vehicle for interacting with a traffic complex, comprising:
a transmitter configured to broadcast a limited range warning signal at a selected frequency, wherein the selected frequency is one of a dedicated emergency frequency and a shared frequency, wherein the transmitter comprises signal modulation and control elements such that the range of the signal can be increased or decreased and such that a broadcast pattern can be changed depending on factors, whereby one factor may be a speed of a vehicle transmitting the warning signal and whereby other factors may be traffic and weather conditions.

3. An intelligent vehicle for interacting with a traffic complex, comprising:
a receiver engaged to a starting mechanism of a vehicle such that the receiver is turned on whenever the vehicle is in operation.

4. An intelligent vehicle for interacting with a traffic complex, comprising:
a built in sound system in the vehicle;
a warning system in the vehicle engaged to the built in sound system;
an interactive voice response communication system in the vehicle engaged to the built in sound system and warning system such that warnings can be advised by the interactive voice response communication system;
wherein each of the warning system and interactive voice response communication system overrides the built in sound system;

wherein warnings originate from a transmitter on at least one of an individual, infrastructure-based component, and in-vehicle component; and

wherein warnings of impending collisions are displayed, sounded, illuminated and advised by interactive voice response communications.

5. An intelligent vehicle for interacting with a traffic complex, comprising:
an automatic anti-skid system that dispenses upon need anti-skid chemicals and particles around and over tires of the vehicle and around and under the vehicle.

6. An intelligent vehicle for interacting with a traffic complex, comprising:
collision avoidance systems, global positioning systems, computer telephony, safety readiness systems, and a processor, and wherein the processor triggers vehicle-control intervention as safety dictates.

7. An intelligent vehicle for interacting with a traffic complex, comprising:
a processor employing computer algorithms with artificial intelligence capabilities for recommending response plans based upon input incident characteristics, wherein said processor learns over time which actions work best, with the processor further having computer simulation modeling to predict potential incidents and incident response impacts ahead of time.

8. An intelligent vehicle for interacting with a traffic complex, comprising:
a continuous, dynamic in-vehicle display of the local speed limit and, optionally, a control to govern to the local speed limit a maximum speed of the vehicle.

9. An intelligent vehicle for interacting with a traffic complex, comprising:
navigation technologies comprising satellite, terrestrial, and dead reckoning technologies.

10. An intelligent vehicle for interacting with a traffic complex, comprising:

communication technologies having voice and data links to geo-synchronous orbit (GEO) and low earth orbit (LEO) satellite, mobile and fixed terrestrial voice and data systems in the 220, 800, and 900 MHz band, and citizens band (CB) radio.

11. An intelligent vehicle for interacting with a traffic complex, comprising:
radar and sensor-based systems that feed into computer-based decision support algorithms, wherein the radar and sensor-based systems have components that gather and relate information on speed, mass, direction of a first vehicle, direction of a second vehicle, number, location, and physical characteristics of occupants of at least one of the vehicles;

wherein, in response to information gathered and related by the radar and sensor-based systems, the computer-based decision support algorithms activate vision enhancement systems, determine if pre-collision safety restraints systems will be deployed, determine if vehicle anti-skid systems will be activated, and determine if vehicle-control intervention will be activated to avoid an imminent collision or its severity; and

wherein said information gathered and related by the radar and sensor-based systems can be supplemented by at least one of infrastructure-based components, components on involved vehicles, and components on pedestrians.

12. An intelligent vehicle for interacting with a traffic complex, comprising:
an automatic vehicle-control intervention system capable of taking temporary, full, and partial control of throttling, braking, and steering of the vehicle, assisting in appropriate maneuvers, disallowing dangerous moves, and shutting down the vehicle; and
radar and sensor-based systems, global positioning systems, navigation and communications technologies, automatic vision enhancement, on-line speed limit displays and speed limit controls, computer telephony, safety readiness systems, and warning systems.

13. An intelligent vehicle for interacting with a traffic complex, comprising:

an automatic vision enhancement system capable of imaging and sensing an outside scene, dynamically overlaying said scene on a front windshield, on in-vehicle displays, on glasses worn by a person; and

an interactive voice response communication system;
wherein the automatic vision enhancement system includes active and passive technologies including global positioning systems and regular charged-couple-device cameras that are employed for visual enhancement when an external light source is available to extend a visibility band of said cameras.

14. An intelligent vehicle for interacting with a traffic complex, comprising:
 - a computer telephony system comprising interactive voice response communications, messages on local variable signs, in-vehicle displays, a telephone, voice mail, audible e-mail, visible e-mail, audible fax, visible fax, data/voice integration, and personal computer based call-processing; and
 - a pattern-matching rules engine to which database messages are subject, wherein the pattern-matching rules engine assigns messages to categories and to proper expertise groups and attaches suggested responses whereby a response or crafted response is produced.

15. An intelligent vehicle for interacting with a traffic complex, comprising:
 - radar and sensor-based systems having microwave radar, millimeter-wave radar, laser radar (LIDAR or light detection and ranging), ultrasound, video image processing, infrared imaging, infrared illumination, and ultraviolet illumination.

16. An intelligent vehicle for interacting with a traffic complex, comprising:
 - radar systems utilizing pulse, pulse doppler, frequency-modulated continuous-wave, binary phase modulation, and frequency modulation transmission modes.

17. An intelligent vehicle for interacting with a traffic complex, comprising:

radar and sensor-based systems including means for processing real-time data received from transducers, sensors and other data sources that monitor a physical process in a traffic complex, with the radar and sensor-based systems further including means for generating signals, via a processor, to elements in the traffic complex that can have an impact upon the physical process.

18. An intelligent vehicle for interacting with a traffic complex, comprising:
radar sensors built into integrated circuit chips.
19. An intelligent vehicle for interacting with a traffic complex, comprising:
radar and sensor-based systems; and
an interactive voice response communication systems;
whereby sensed and imaged scenes, including images invisible to the naked eye, are converted into dynamic, visible and audible displays for providing information and sight.
20. An intelligent vehicle for interacting with a traffic complex, comprising:
means for utilizing algorithms for initiating and advising of appropriate, predetermined actions in response to sensed obstructions and hazards.
21. An intelligent vehicle for interacting with a traffic complex, comprising:
an automated vision enhancement system that is activated when communications are received from active and passive electronic tags and infrastructure-based components that are placed around obstructions and hazards, and wherein said automated vision enhancement system optionally provides additional lighting.
22. An intelligent vehicle for interacting with a traffic complex, comprising:
means for transmitting electromagnetic energy into vehicle surroundings and detecting energy reflected by objects so as to convert images that are invisible to the naked eye into visible images.

23. An intelligent vehicle for interacting with a traffic complex, comprising:
a tracking system that, upon receiving a designated signal, emits a radio signal
that is used for detecting, identifying, and locating at least one of a person and vehicle.

24. An intelligent vehicle for interacting with a traffic complex, comprising:
an interactive voice response communications system;
in-vehicle emergency flashing lights; and
messages and other warnings;
whereby a driver attempting to pass another vehicle is warned when sensed and
imaged data is fed into the computer-based decision support algorithms that determine
that the risk of a head-on collision is too great or imminent and that automatically invoke
vehicle-control intervention to prohibit said intelligent vehicle from passing.

25. An intelligent vehicle for interacting with a traffic complex, comprising:
a transmitter and means for issuing an electronic notification from the transmitter
to other vehicles when a lane change is being initiated.

26. An intelligent vehicle for interacting with a traffic complex, comprising:
means for receiving signals from advancing and threatening vehicles;
a global positioning system to locate a position of the advancing and threatening
vehicle; and
optionally, means for vehicle-control intervention such that vehicle-control
intervention is automatically invoked by either vehicle.

27. An intelligent vehicle for interacting with a traffic complex, comprising:
an automatic vision enhancement system; and
means for sensing electronic tags engaged with features of the traffic complex,
whereby glare from sunlight or on-coming headlights that adversely affect a
driver's vision can be overcome.

28. An intelligent vehicle for interacting with a traffic complex, comprising:

- means for sensing an intersection with no traffic controls;
- means for initiating electronic notification to another vehicle at or approaching the intersection with no traffic controls; and
- protocol means for determining which vehicle shall proceed first; and
- protocol control means with vehicle-control intervention means to assure protocols are observed.

29. An intelligent vehicle for interacting with a traffic complex, comprising:

- means for detecting and following an electronic path that guides vehicles and keeps them in their respective lanes;
- means for assisting in appropriate maneuvers;
- means for intervening in vehicle control;
- means for disallowing dangerous moves;
- means for employing a global positioning system, a global positioning steering system;
- means for automatically shutting down the vehicle, decelerating, braking;
- means for automated vision enhancement; and
- means for overriding said global positioning steering system.

30. An intelligent vehicle for interacting with a traffic complex, comprising:

- means for employing a computer representation generated by a global positioning system to enhance the visibility of features of the traffic complex whereby vision is enhanced of pavement edges, pavement markings and pedestrians among other features of the traffic complex.

31. An intelligent vehicle for interacting with a traffic complex, comprising:

- forward-looking radar sensors and means in the forward-looking radar sensors for sensing slippery conditions;

at least one of audible and visible display means to warn of the slippery conditions to a driver of the vehicle;

means for automatically decelerating and braking; and
optionally, dispensing anti-skid particles.

32. An intelligent vehicle for interacting with a traffic complex, comprising:
a meteorology sensor including means for predicting weather conditions and further including means for automatically and dynamically changing on-line posted speed limits in the vehicle as weather, visibility, and road conditions warrant.

33. An intelligent vehicle for interacting with a traffic complex, comprising:
means for receiving information on automatic vehicle counts; and
means for at least one of visibly and audibly displaying the information and advisories on local variable message signs and on in-vehicle displays to facilitate traffic control, incident management, and route guidance.

34. An intelligent vehicle for interacting with a traffic complex, comprising:
means for transmitting and receiving electronic signals to and from other vehicles including means for warning when another vehicle is too close, relative to respective speeds, as warranted, and means for automatically decelerating and braking a trailing vehicle such that a trailing vehicle that is advancing unsafely close automatically decelerates and brakes until a safe distance, relative to said respective speeds, is achieved; and
optionally, means for at low speeds activating and deactivating said means for automatically decelerating and braking.

35. An intelligent vehicle for interacting with a traffic complex, comprising:
means for sensing to the front, sides and rear of the intelligent vehicle including means for gathering information on the distance to and relative velocity of features of the traffic complex.

36. An intelligent vehicle for interacting with a traffic complex, comprising:
means for sensing dangerous characteristics of the intelligent vehicle including
means for shutting down and rendering inoperable the intelligent vehicle; and
means for sensing said dangerous characteristics in advance including means for
communicating advance warnings of said dangerous characteristics to a driver of the
intelligent vehicle.

37. An intelligent vehicle for interacting with a traffic complex, comprising:
law enforcement vehicles, with means for automatically shutting down and
rendering temporarily inoperable vehicles being pursued, thus eliminating need for high
speed chases, with said means including encryption software, and means for non-law
enforcement vehicles to decode transmitted vehicle shutdown signals having tamper-
proof de-encryption software.

38. An intelligent vehicle for interacting with a traffic complex, comprising:
continuous-wave radar including means for illuminating and detecting vehicles by
techniques employing semiconductor tracer-diode surveillance utilizing at least one
carrier frequency and looking for reflections of the third harmonic.

39. An intelligent vehicle for interacting with a traffic complex, comprising:
means for enhancing dynamic vision of an imaged and scanned scene when
warning signals are received, with said means including means for automatically zooming
in on an area of danger.

40. An intelligent vehicle for interacting with a traffic complex, comprising:
means for employing global positioning satellites to provide coordinates of an
immediate scene, with said means including means for permitting precise mathematical
correlation of a surrounding scene and earth science data, and automated vision
enhancement.

41. An intelligent vehicle for interacting with a traffic complex, comprising:
means for receiving transmissions from a feature of the traffic complex; and
a safety system including means for determining when an accident is imminent
with said feature of the traffic complex and further including means for permitting control
of a vehicle to be taken over by vehicle-control intervention when an accident is
imminent.

42. An intelligent vehicle for interacting with a traffic complex, comprising:
first means for sensing a malfunction of the intelligent vehicle;
second means for sensing when the intelligent vehicle is in need of service;
third means for activating an in-vehicle display, with the third means being in
communication with the first and second means; and
fourth means for activating an audible display, with the fourth means being in
communication with the first and second means.

43. An intelligent vehicle for interacting with a traffic complex, comprising:
means for producing images to audible displays employing interactive voice
response communications.

44. An intelligent vehicle for interacting with a traffic complex, comprising:
means for producing an over-laid dynamic map of an immediate area using global
positioning satellites and land information systems.

45. An intelligent vehicle for interacting with a traffic complex, comprising:
means for employing global positioning satellites to provide directions to desired
destinations, with data continuously updated via wireless modems.

46. An intelligent vehicle for interacting with a traffic complex, comprising:

first means for communicating with a traffic signal of the traffic complex including second means for determining when the traffic signal will turn red and whether a vehicle can clear an intersection controlled by the traffic signal and further including third means for automatic vehicle control to take control of the vehicle if the vehicle cannot clear the intersection; and

wherein the third means having fourth means for communicating with the traffic signal when the third means has taken control of the vehicle, with the four means having a signal for authorizing said traffic signal to turn all traffic signals at said intersection red such that all traffic stops.

47. An intelligent vehicle for interacting with a traffic complex, comprising:
diagnostic means for detecting dangerous emissions inside of the vehicle including means for logging, identifying and classifying emissions detected inside of the vehicle; and
at least one of a visual or audible alarm in communication with the diagnostic means and being activated when said dangerous emissions are sensed.

48. An intelligent vehicle for interacting with a traffic complex, comprising:
sensor means for warning against impending collisions, vehicle defects, infrastructure defects, and emission levels.

49. An intelligent vehicle for interacting with a traffic complex, comprising:
first means for activating in-vehicle emergency flashing lights for warning and instructing when an emergency vehicle is approaching, with the first means being activated by at least one of an infrastructure feature and the emergency vehicle.

50. An intelligent vehicle for interacting with a traffic complex, comprising:
identification address means unique to the vehicle for counting, tracking, warning, controlling, making predictions, and communicating with the vehicle, and with said identification address means having information on speed and direction of the vehicle.

51. An intelligent vehicle for interacting with a traffic complex, comprising:

- first means for detecting a railroad crossing;
- second means for vehicle control intervention;
- third means for sensing an attempt to cross the railroad crossing against warning signals and for sending a signal to the second means; and
- fourth means for sensing an imminent collision between the vehicle and a train and for sending a signal to the second means.

52. An intelligent vehicle for interacting with a traffic complex, comprising:

- safety readiness warning systems comprising means for monitoring vehicle malfunctions affecting safety, means for monitoring a psychological condition of a driver, means for advising a driver of abnormal driving performance of said driver where said abnormal driving performance is compared to a baseline performance of said driver, means for enhancing perceptions of a driving environment, means for providing information about potential safety hazards, means for warning of impending collisions, means for assisting in making appropriate vehicle maneuvers, and means for intervening with automatic controls and vehicle shutdowns such that nearby vehicles, pedestrians, and law enforcement are warned, emergency flashing lights at intersections and in-vehicle emergency flashing lights are activated, and nearby traffic signals are changed to a stop signal until said vehicle at issue is brought under control.

53. An intelligent vehicle for interacting with a traffic complex, comprising:

- sensors for monitoring a psycho-physiological condition of a driver, wherein said sensors include a heart and respiratory rate sensor, an electrodermal activity sensor, a blink rate sensor, a head nodding sensor, a lane change sensor, a sensor for sensing changes in the use of accelerator and brake pedals;
- means for comparing results from said sensors with baseline performance;
- means for feeding results from said sensors into computer-based decision support algorithms which initiate vehicle-shutdown whereby a vehicle is shutdown and becomes

temporarily inoperable when a driver falls asleep, is intoxicated, is taken ill, or when safety dictates.

54. An intelligent vehicle for interacting with a traffic complex, comprising:
means for receiving and carrying out instructions from a component on a pedestrian where said component can communicate with traffic signals of said traffic complex, and wherein said means for receiving and carrying out instructions includes means for vehicle-control intervention.